Attachment A has the following information: 1) It has a table listing what the pollutant concentrations your industrial discharge must comply with. To avoid confusion, the limits for your specific operation will be highlighted; 2) A table lists the compliance dates for the electroplating/metal finishing categories. Again, the requirements for your specific category will be highlighted; 3) A list from the Federal Register showing what processes are covered by the metal finishing regulations. Job shops and independent circuit board manufacturers are not covered by the metal finishing regulations; and 4) A summary of treatment technologies that are available and in use by metal finishers/electroplaters.

Table 1

METRO'S PRETREATMENT DISCHARGE LIMITS FOR THE

ELECTROPLATING/METAL FINISHING PRETREATMENT CATEGORIES (in mg/l)

					Metal Fi	Inishing
	Electroplating Category (f)			y (f)	Category(e)	
	Less Than 10,000 GPD		10,000 GPD Or More		Any Size	
Parameter	Daily Max	4-Day Average	Daily Max	4-Day Average	Daily Max	4-Day Average
Arsenic	1.0	NA (a)	1.0	NA (a)	1.0	NA (a)
Cadmium	1.2	0.7	1.2 ^(b)	0.7	0.69	0.26
Chromium	6.0	NA	6.0	4.0	2.77	1.71
Copper	3.0	NA	3.0	2.7	3.00	2.07
Lead	0.6	0.4	0.6 ^(b)	0.4	0.69	0.43
Mercury	0.1	NA	0.1	N A	0.1	N A
Nickel	6.0	NA	4.1	2.6	3.98	2.38
Silver	1.0	NA	1.0	N A	1.0	N A
Zinc	5.0	NA	4.2	2.6	2.61	1.48
Cyanide, A	NΑ	NA	N A	N A	0.86 ^(c)	0.32 ^(c)
Cyanide, T	2.0	NA	1.9 ^(b)	1.0	1.20	0.65
TTO (g)	4.57	NA	2.13	NA	2.13	NA
Total Metals	N A	NA	10.5 ^{(d}	6.8	N A	N A
рН	≽5.5	NA 7	.5-10.0 ^{(b}) NA	≱5. 5	N A
TSS	NA	NA	20.0 (b) _{13.4} (b)	NΑ	NA
Oil and Greas	e 100	NA	100	NA	100	N A

FOOTNOTES TO TABLE 1

- (a) Not applicable or no discharge limit.
- (b) With the approval of Metro, electroplaters discharging 10,000 gallons or more which do not have wastewaters containing strong chelating agents, and who reduce hexavalent chromium wastes and neutralize wastewater with calcium oxide (or hydroxide), may satisfy regulatory requirements by complying with the cyanide (T), lead, cadmium, pH, and TSS limits. Otherwise, they must comply with all identified discharge limits and pH ≥5.5, but no TSS limit.
- (c) Upon agreement by Metro the amenable cyanide(A) limit may apply in place of total (T)cyanide limit shown.
- (d) "Total Metal" is defined as the sum of the concentration or mass of copper, nickel, chromium (total), and zinc.
- (e) The concentration limits shown under this heading are also the "Pretreatment Standards for New Sources" for the metal finishing category. These new source standards are effective as of the effective date of these regulations (August 29, 1983).
- (f) Metal finishers must comply with the electroplating discharge limits as interim limits until the metal finishing discharge limit compliance dates become effective.
- (g) Total Toxic Organics (TTO) is the summation of all values greater than 0.01 mg/l for each of the specified toxic organics. (See Attachment B.)

Table 2

COMPLIANCE DATES FOR THE ELECTROPLATING/METAL FINISHING PRETREATMENT CATEGORIES

ELECTROPLATING CATEGORY

Discharge Limits

Electroplating - Metals and cyanide for existing facilities

Electroplating - Total Toxic Organics (TTO, e.g., solvents) for existing facility based on Best Management Practices (BMP) followed by precipitation/ clarification

Compliance Dates

April 27, 1984 (electroplating category) June 30, 1984 (metal finishing category)

METAL FINISHING CATEGORY

Discharge Limits

Electroplating - Metals,
 cyanide, and TTO (based on BMP) for existing facilities

Compliance Dates

June 30, 1984

February 15, 1986

July 15, 1986

Metal Finishing - Metals, cyanide, and TTO (based on BMP followed by precipitation and clarification) for existing facilities

Metal Finishing - Any new facility

From commencement of discharge

FOOTNOTES TO TABLE 2

- (a) Metro will be regulating any industrial discharger who performs one or more of the processes listed on Attachment C. The two categories are separated as:
 - Electroplating category Circuit board manufacturers and job shops. Job shops are defined as facilities which own not more than 50% (annual area basis) of the materials undergoing metal finishing.
 - Metal finishing category Manufacturers
 who own more than 50% (annual area basis)
 of the products they perform plating or
 metal finishing operations on. Metal
 finishers are required to first comply
 with the electroplating category compliance
 dates and discharge limits and then, in
 addition, comply with the metal finishing
 requirements.

to that effect through a technical amendment to this regulation.

XXII. List of subjects

40 CFR Part 413

Electroplating, Metals, Water pollution control. Waste treatment and disposal.

40 CFR Part 433

· Electroplating, Metals, Water pollution control. Waste treatment and

Dated: July 5, 1983. William D. Ruckelshaus, Administrator.

Authority: Secs. 301, 304, 306, 307, 308, and 501 of the Clean Water Act (the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1251 et. seq., as amended by the Clean Water Act of 1977, Pub. L. 95-217).

[Note.—These appendices will not appear in the CFR.]

XXIII. Appendices

Appendix A-Abbreviations, Acronyms. and Other Terms Used in This Notice

Act—The Clean Water Act. Agency—The U.S. Environmental Protection Agency.

BAT—The best available technology economically achievable under Section 304(b)(2)(B) of the Act.

BCT—The best conventional pollutant control technology, under Section 304(b)(4) of the Act.

BMPS—Best management practices under Section 304(e) of the Act,

BPT-The best practicable dontrol technology currently available under Section 304(b)(1) of the Act.

Captive-A facility which owns more than 50% (annual area basis) of the materials undergoing metal finishing.

Clean Water Act (also "the Act") The Federal Water Pollution Control Act Amendments of 1972 (33 U.S.C. 1251 et seq.), as amended by the Clean Water Act of 1977 (Pub. L. 95-217).

Development Document-Development Document for Effluent Limitations. Guidelines, and Standards for the Metal Finishing Point Source Category: EPA 440-1-80-091-A, June 1980.

Direct discharger—A facility that discharges or may discharge pollutants into waters of the United States.

Indirect discharger—A facility that discharges or may discharge pollutants into a publicly owned treatment works.

Job Shop-A facility which owns not more than 50% (annual area basis) of the materials undergoing metal finishing.

Integrated facility-One that performs electroplating operations (including electroplating, electroless plating, chemical etching and milling, anodizing, coating, and printed circuit board

manufacturing) as only one of several operations necessary for manufacture of a product at a single physical location, and has significant quantities of process wastewater from non-electroplating operations. In addition, to qualify as "integrated," a facility must combine one or more plant electroplating process wastewater lines before or at the point of treatment (or proposed treatment) with one or more plant sewers carrying process wastewater from nonelectroplating manufacturing operations.

NPDES Permit—A National Pollutant Discharge Elimination System permit issued under Section 402 of the Act.

NSPS—New source performance standards promulgated under Section 306 of the Act.

POTW-Publicly owned treatment works.

PSES-Pretreatment standards for existing sources of indirect discharges promulgated under Section 307(b) of the

PSNS-Pretreatment standards for new sources of direct discharges, promulgated under Section 307 (b) and (c) of the Act.

RCRA-Resource Conservation and Recovery Act (Pub. L. 94-580) of 1976. Amendments to Solid Waste Disposal Act, as amended.

TTO-Total Toxic Organics is the summation of all values greater than .01 milligrams per liter for each of the specified toxic organics.

Appendix B—Pollutants Excluded From Regulation

(1) Toxic Pollutants—found in only a small number of sources and effectively controlled by the technologies on which the limits are based:

Antimony Arsenic Asbestos Bery!lium Mercury Selenium Thallium

(2) Conventional Pollutants:

BOB Fecal Coliform

Appendix C-Unit Operations in the Metal Finishing Industry

- 1. @Electroplating
- 2. Electroless Plating
- 3. Anodizing
- 4. Coating (Chromating, Phosphating, and Coloring)
- 5. Chemical Etching and Milling
- 6. Printed Circuit Board Manufacturing
- 7. Cleaning
- 8. Machining
- 9. Grinding
- 10. Polishing
- 11. Tumbling

- 12. Burnishing
- 13. Impact Deformation
- 14. Pressure Deformation
- 15. Shearing
- 16. Heat Treating
- 17. Thermal Cutting
- 18. Welding
- 19. Brazing
- 20. Soldering
- 21. Flame Spraying
- 22. Sand Blasting
- 23. Other Abrasive Jet Machining
- 24. Electric Discharge Machining
- 25. Electrochemical Machining
- 26. Electron Beam Machining
- 27. Laser Beam Machining
- 28. Plasma Arc Machining
- 29. Ultrasonic Machining
- 30. Sintering
- 31. Laminating
- 32. Hot Dip Coating
- 33. Sputtering
- 34. Vapor Plating
- 35. Thermal Infusion 36. Salt Bath Descaling
- 37. Solvent Degreasing
- 38. Paint Stripping
- 39. Painting
- 40. Electrostatic Painting
- 41. Electropainting
- 42. Vacuum Metalizing
- 43. Assembly
- 44. Calibration
- 45. Testing
- 46. Mechanical Plating

PART 413—ELECTROPLATING POINT **SOURCE CATEGORY**

For the reasons stated above, EPA is amending Part 413 of 40 CFR, Chapter I as follows:

1. Section 413.01 is amended by revising paragraph (a) to read as follows:

§ 413.01 Applicability and compliance

(a) This part shall apply to electroplating operations in which metal is electroplated on any basis material and to related metal finishing operations as set forth in the various subparts. whether such operations are conducted in conjunction with electroplating. independently, or as part of some other operation. The compliance deadline for metals and cyanide at integrated facilities shall be June 30, 1984. The compliance date for metals and cyanide at non-integrated facilities shall be April 27, 1984. Compliance with TTO for all facilities shall be July 15. 1986.1 These

^{*} The Consent Decree in NRDC v. Train. 12 ERC 1833 (D.D.C. 1979) specifies a compliance date for PSES of no later than June 30, 1984. EPA has moved for a modification of that provision of the Decree. Should the Court deny that motion. EPA will be required to modify this compliance date

4. TREATMENT TECHNOLOGIES

The treatment technologies described in this section are currently used by metal finishers/electroplaters to remove or recover wastewater pollutants normally generated. Figure 4.1 is an example of the current technology commonly used for treatment of metal finishing wastewater. As indicated, wastestream segregation allows the recovery of precious metals, the reduction of hexavalent chromium, the destruction of cyanide, and the removal and recovery of oils prior to the removal of common metals. Wastestream segregation can reduce the flow of wastewater to the treatment system and, accordingly, reduce the cost of treatment.

4.1 TREATMENT OF COMMON METALS WASTE

The technology basis for the pretreatment standards consists of hydroxide precipitation followed by sedimentation. Hydroxide precipitation is used to precipitate dissolved metals by chemical addition so that they can be removed by physical means such as sedimentation or filtration. Hexavalent chromium is not removed by this treatment system and cyanide will interfere with the system's ability to remove the dissolved metals. These raw waste types should be treated before entering this system.

The EPA also considered but rejected the addition of filtration to the selected technology basis to remove additional suspended solids (such as metal hydroxides) which did not settle out in the clarifier. It may be appropriate in cases where there are specific ambient water quality problems. The technology basis treatment system plus in-plant cadmium controls (such as evaporative recovery and ion exchange) was used as the technology basis for new source pretreatment standards.

Alternative treatment methods for common metals removal, to be used in conjunction with or in place of the preceeding methods, include peat adsorption, insoluble starch xanthate filtration, sulfide precipitation, flotation, and membrane filtration.

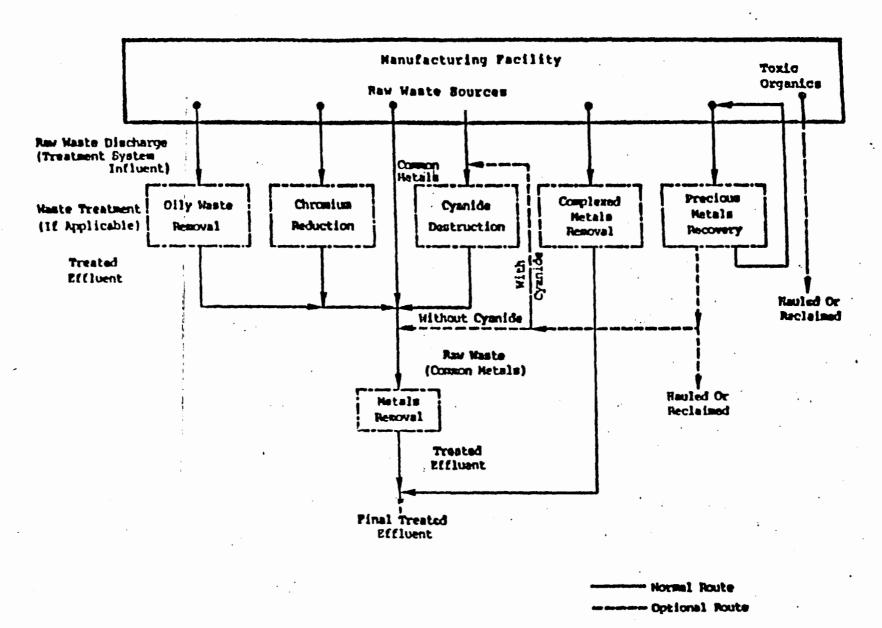


FIGURE 4.1
WASTEWATER TREATMENT SCHEMATIC

Note: Discharge from precious metals recovery may be hauled in alternative ways, depending on the recovery method in use.

4.2 TREATMENT OF COMPLEXED METAL WASTES

Complexed metals are tied up by chemicals (complexing agents such as amm nia and citric acid) which prevent the metals from settling out of s luti n. Complexed metal wastes are a product of electroless plating, immersion plating, etching and printed circuit board manufacturing. Metals tied up in solution counteract the conventional precipitation technique. As a result, segregated treatment of the complexed metal wastes is recommended.

High pH precipitation is a process involving the addition of chemicals which drastically increase the pH to around 12, prompting a shift in the complex dissociation equilibrium and resulting in the production of free metal ions. The metal ions can then be precipitated by available hydroxide ions and removed by sedimentation.

The chemical reduction process adds chemicals to lower the pH of the wastestream (to break up the various metal complexes) followed by the addition f a reducing agent to reduce the metals to an oxidation state which permits precipitation of the metals. Additional chemicals to raise the pH are then added to form metallic precipitates which settle out of solution. Media or membrane filtration is an alternate method to sedimentation for solids removal.

Modifying the hydroxide precipitation process by substituting sulfide precipitation can improve system performance in the removal of complexed heavy metals. The ferrous sulfate technique is capable of achieving low metal solubilities in spite of the presence of certain complexing agents.

4.3 TREATMENT OF PRECIOUS METALS WASTES

Treatment of precious metals consists of the technology basis for common metals wastes plus precious metals recovery including evaporation, ion exchange, and electrolytic recovery. Evaporation is used to recover precious metals by boiling off the water portion of the precious metal solution and removing the metal.

Ion exchange is the process in which ions, held by electrostatic forces to charged functional groups on the surface of an ion exchange resin, are exchanged for ions of similar charge from the solution in which the resin is immersed. Ion exchange is commonly used for precious metal recovery, especially gold.

Electrolytic recovery is particularly applicable to precious metals recovery because the valuable precious metals offer a faster payback on equipment and energy costs. The process consists of a dragout rinse after the plating step and an off line electrolytic recovery tank.

4.4 TREATMENT OF HEXAVALENT CHROMIUM

The treatment of hexavalent chromium involves reducing hexavalent chromium to trivalent chromium and removal with a conventional precipitation-solids removal system. Reduced (trivalent) chromium is able to be separated from solution in conjunction with other metallic salts by alkaline precipitation. In most cases, gaseous sulfur dioxide is used as the reducing agent in the reduction of hexavalent chromium which enables the trivalent chromium to be separated from solution by alkaline precipitation.

Alternative hexavalent chromium treatment techniques include electrochemical chromium reduction, regeneration, evaporation, and ion exchange.

4.5 TREATMENT OF CYANIDE WASTES

Treatment of cyanide is almost exclusively performed by alkaline chlorination which focuses upon oxidizing the cyanide which is amenable to chlorination. The destruction of cyanide results in products of carbon dioxide and nitrogen. Additionally, ferrous sulfate may be used to precipitate complexed cyanides.

Alternative treatment techniques for the destruction of cyanide include xidation by oz ne, ozone with ultraviolet radiation, hydrogen peroxide, and electrolytic xidation.

4.6 TREATMENT OF OILY WASTES

Techniques commonly used by electrolaters and metal finishers to remove oils include skimming, coalescing, emulsion breaking, flotation, centrifugation, ultrafiltration, and reverse osmosis. Treatment of oily wastes is most efficient and cost effective if oils are segregated from other wastes and treated separately. The process of separation varies depending on the type of oil involved.

4.7 IN-PLANT CONTROL OF TOXIC ORGANICS

The primary control technology for toxic organics is proper storage of concentrated toxic organics without discharging directly into wastestreams and segregation from other wastes that will enter the waste treatment system. Spent degreasing solvents may be segregated from other wastes by providing and identifying the necessary storage containers, training personnel in the use of the techniques, and holding periodic check-ups to ensure that proper segregation is occurring. The separate waste solvents can then be recovered on-site or contract hauled.

Using cleaning techniques that require no solvents will eliminate or reduce the quantity of toxic organics found in wastewater. Cleaning techniques may include wiping, immersion, spray techniques using water, alkaline and acid mixtures, and solvent emulsions.

Toxic organics that enter the wastestreams can be removed by treatment technologies used for the control of other pollutants. Toxic organics tend to be more soluble in oil and grease than in water. Thus removal of oil and grease will reduce the discharge of toxic organics. Other possible mechanisms for removal include adsorption, settling, and volatilization, which can occur during treatment of metals, cyanide, and oil and grease.

Specific treatment technologies which are not part of the technology basis of the regulation but are applicable for the treatment of TTO include carbon adsorption and reverse osmosis, resin adsorption, ozonation, chemical oxidation, and aerobic decomposition.

4.8 TREATMENT OF SLUDGES

Sludges are created by waste treatment technologies which remove solids from wastewater. Sludge thickening is used to concentrate dilute sludges by a mechanical device such as a vacuum filter or centrifuge. Doubling the solids content reduces capital and operating costs and reduces costs for hauling. Pressure filtration is achieved by pumping the liquid through a filter material which is impenetrable to the solid phase. Sludge bed drying is employed to reduce the water content of sludges so that they can be mechanically collected for removal. Sludge may then be transported to landfills or incinerated.

Additional removal methods for industrial waste sludges include chemical containment, encapsulation, fixation, and thermal conversion.

4.9 IN-PROCESS CONTROL TECHNOLOGIES

In-process control techniques have been developed and are being utilized by electroplaters and metal finishers. These techniques deal with reducing water usage, reducing drag out of pollutants and efficient handling of process wastes and include:

- Flow reduction through efficient rinsing
- Countercurrent and static rinsing
- Process bath conservation
- Waste oil segregation
- Process bath segregation
- Process modification
- Cutting fluid cleaning
- Integrated waste treatment
- Good housekeeping

Reducing the water usage at metal finishing facilities is the most important control and results in reduced pollutant discharge and consequently reduced costs for wastewater treatment. It is estimated that rinse steps consume most of the water used at metal finishing facilities. Therefore, efficient rinse systems would lead to the greatest water use reductions. Several rinsing techniques are currently used at metal finishing facilities.

Of these, the countercurrent rinse provides for the most efficient water usage, and consists of only one fresh water feed introduced in the last tank. The dead or static rinse is applicable for initial rinsing after metal plating and allows for easier metals recovery and lower water usage.